Claims

1. A polymeric urea-urethane prepared by a first reaction of a diisocyanate with a polyol;
wherein excess diisocyanate is used to form an isocyanate mixture comprising a doubly NCO-terminated urethane prepolymer and excess diisocyanate; and

followed by a second reaction of the isocyanate mixture with an amine mixture comprising at least one primary monoamine and at least one primary diamine;
wherein the amount of diamine is from 0.1 to 45 equivalents, based on 100 equivalents of the mixture of primary monoamine and primary diamine;
with the proviso that after the second reaction the polymeric urea-urethane present is substantially free of isocyanate and of the monoamine and the diamine,
wherein the diisocyanate, polyol, monoamine and diamine can be single components or mixtures.

2. The polymeric urea-urethane according to Claim 1, wherein the diisocyanate has the general formula (I)

$$OCN-R^1-NCO \qquad (I)$$

the polyol has the general formula (II)

$$HO-R^2-OH \qquad (II)$$

the monoamine has the general formula (III)

$$R^3-NH_2 \qquad (III)$$

and the diamine has the general formula (IV)

$$H_2N-R^4-NH_2 \qquad (IV)$$

wherein R^1 is a linear or branched alkylene radical having 1 to 8 carbon atoms, a cycloaliphatic radical, an arylene radical or an aralkylene radical; wherein the radicals can be optionally substituted by C1 to C4 alkyl groups;

R^2 is a polyester radical, polyether radical, mixed polyester-polyether radical, polycarbonate radical or polyolefin radical; wherein the polyethers can be optionally substituted by styrene oxide;

R^3 is a linear or branched alkyl radical having from 2 to 8 carbon atoms, a cycloalkyl radical, an arylene radical or an aralkylene radical; wherein the radicals can optionally have one or more heteroatoms; and optionally be substituted by C1 to C4 alkyl groups or C1 to C4 alkoxy groups, or R^3 is a radical of the type aryl-CO-NH-;

R^4 is a linear or branched alkylene radical having from 1 to 12 carbon atoms, a cycloaliphatic radical, a polyether radical, an arylene radical or an aralkylene radical; wherein the radicals can be optionally substituted by C1 to C4 alkyl groups, or R^4 is a radical of the type $-NH-CO-R^5-CO-NH-$; and

R^5 is a linear alkylene radical having 1 to 8 carbon atoms, a single bond or an arylene radical.

3. The polymeric urea-urethane of Claim 1, wherein the doubly NCO-terminated urethane prepolymer is formed from n molecules of the diisocyanate and n-1 molecules of the polyol wherein n is an integer from 2 to 6.

4. The polymeric urea-urethane of Claim 3, wherein n is an integer from 2 to 4.

5. The polymeric urea-urethane of Claim 1, wherein the reaction of the isocyanate mixture and the amine mixture is conducted in a polar aprotic solvent, optionally in the presence of a lithium salt.

6. The polymeric urea-urethane of Claim 1, wherein the polyol is a diol.

7. The polymeric urea-urethane of Claim 6, where the diol possesses a number-average molecular weight of from about 100 to about 4000 g/mol.

8. The polymeric urea-urethane of Claim 7, where the diol is selected from compounds selected from the group consisting of polyester diols, polyether diols, mixed polyester polyether diols, polycarbonate diols, polyolefin diols, polyoxyethylene-*block*-polyoxypropylene glycols, and derivatives or mixtures of these compounds.

9. The polymeric urea-urethane of Claim 8, wherein the diol includes styrene oxide, incorporated by copolymerization.

10. The polymeric urea-urethane of Claim 1, wherein the having more than two equivalents of diisocyanate per polyol equivalent.

11. The polymeric urea-urethane of Claim 1, wherein the isocyanate mixture is isolated before reaction with the amine mixture.

12. The polymeric urea-urethane of Claim 1, wherein the amount of diamine is from 1 to about 35 equivalents of diamine, based on 100 equivalents of the mixture of primary monoamine and primary diamine.

13. The polymeric urea-urethane of Claim 12, wherein the amount of diamine is from about 3 to about 25, equivalents of diamine based on 100 equivalents of the mixture of primary monoamine and primary diamine.

14. A process for preparing a polymeric urea-urethane of Claims 1, comprising a first reaction a diisocyanate is reacted with a polyol, wherein the diisocyanate is used in excess, to form an isocyanate mixture comprising a doubly NCO-terminated urethane prepolymer and excess diisocyanate; and
a second reaction of the isocyanate mixture and an amine mixture comprising at least one primary monoamine and at least one primary diamine;
wherein the amount of diamine is from 0.1 to 45 equivalents, based on 100 equivalents of the mixture of primary monoamine and primary diamine;
with the proviso that after the second reaction the polymeric urea-urethane present is substantially free of isocyanate and of the monoamine and the diamine,
wherein the diisocyanate, polyol, monoamine and diamine can be single components or mixtures.

15. The process of Claim 14, wherein the diisocyanate has the general formula (I)

$$OCN-R^1-NCO \qquad (I)$$

the polyol has the general formula (II)

$$HO-R^2-OH \qquad (II)$$

the monoamine has the general formula (III)

$$R^3-NH_2 \qquad (III)$$

the diamine has the general formula (IV)

$$H_2N-R^4-NH_2 \qquad (IV)$$

wherein R^1 is a linear or branched alkylene radical having 1 to 8 carbon atoms, a cycloaliphatic radical, an arylene radical or an aralkylene radical; wherein the radicals can be optionally substituted by C1 to C4 alkyl groups;

R^2 is a polyester radical, polyether radical, mixed polyester-polyether radical, polycarbonate radical or polyolefin radical; wherein the polyethers can be optionally substituted by styrene oxide;

R^3 is a linear or branched alkyl radical having from 2 to 8 carbon atoms, a cycloalkyl radical, an arylene radical or an aralkylene radical; wherein the radicals can optionally have one or more heteroatoms; and optionally be substituted by C1 to C4 alkyl groups or C1 to C4 alkoxy groups, or R^3 is a radical of the type aryl-CO-NH-;

R^4 is a linear or branched alkylene radical having from 1 to 12 carbon atoms, a cycloaliphatic radical, a polyether radical, an arylene radical or an

aralkylene radical; wherein the radicals can be optionally substituted by C1 to C4 alkyl groups, or R^4 is a radical of the type -NH-CO-R^5-CO-NH-; and R^5 is a linear alkylene radical having 1 to 8 carbon atoms, a single bond or an arylene radical.

16. The process of Claim 14, wherein the reaction of the isocyanate mixture and the amine mixture is conducted in a polar aprotic solvent, and optionally in the presence of a soluble lithium salt.

17. The process of Claim 14, wherein the amount of diamine is from 1 to about 35 equivalents of diamine, based on 100 equivalents of the mixture of primary monoamine and primary diamine.

18. The process of Claim 17, wherein the amount of diamine is from about 3 to about 25, equivalents of diamine based on 100 equivalents of the mixture of primary monoamine and primary diamine.

19. A liquid polymer system comprising a polyester resin, epoxy resin, polyurethane resin, acrylate resin, methacrylate resin, acrylate-amino resin, acrylate-isocyanate resin, nitrocellulose resin, cellulose acetobutyrate resin, alkyd-amino resin, alkyd resin, melamine resin, urea resin, silicone resin or mixtures thereof and the polymeric urea-urethanes of Claim 1, as a rheology control agent.

20. The liquid polymer system of Claim 19, further comprising solvents, wherein the solvents can

optionally react with the polymer resin of the polymer system.

21. The liquid polymer system of claim 19, wherein the polymer system is a coating material, floor coating composition, adhesive, laminating resin, gel coat, PVC plastisol, molding compound, sealant, joint sealing compound, filling compound or printing ink.

22. The liquid polymer system of claim 19, further comprising fillers, pigments, or binders.